

REMARKS

Status of Claims

Claims 1-15 are pending in the application

The claims have been amended for greater clarity according to the helpful recommendations of the Examiner. Support for specific amendments can be found in paragraphs [0012] – [0014] of the specification as published.

Claim Objections

Claims 1 and 15 is objected to because of the following informalities:

According to the Examiner: *In claim 1, line 5, recites, "operator in such a manner". it is not clear that "such" a phrase should not be in the claims.*

Similarly claim 15 needs to be corrected .

In claim 1, line 6, change "," to -- ; --

In claim 1, line 9, change " " to -- ; --

Similarly claims 4, 11 and 15 needs to be corrected . Appropriate correction is required.

In response, Applicants have carefully reviewed and revised the claims.

Claim Rejections - 35 USC § 101

Claim(s) 1- 10, 14 and 15 are rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter as follows. Claims 1 and 15, recites a first step transforming image data set with a signature operator that for each pixel a signature strings is computed and recorded in a signature table with pixel coordinates, checking the entries in the two signature tables with respect to signature strings exists which can be found in both tables and generating a correspondence hypothesis for the coordinates associated with signature strings and storing hypothesis list for further processing which does not impart functionality to a computer or computing device, and is thus considered nonfunctional descriptive material.

Such nonfunctional descriptive material, in the absence of a functional interrelationship with a computer, does not constitute a statutory process, machine, manufacture or composition of matter and is thus non-statutory per se. Non-functional descriptive is non-statutory regardless of whether it is claimed as residing on a computer readable medium.

Applicants respectfully traverse.

As explained in paragraph [0005] of the specification as published, in the processing of image data relating to moving scenes, in particular in the recognition and tracking of objects located therein, it is necessary to identify image points or, as the case may be, image areas, which correspond to each other in the separate chronologically sequential image data sets. As explained in paragraph [0006], it is however difficult to recognize objects from the image data obtained from the environment and to measure their movement parameters, i.e., it is difficult to determine which of the image points at moment i correspond with which image points of the camera image at moment j, that is, belongs to the same object. Once an initial presumption of correlation between two image points has been made, the presumption must be tested. Hypotheses are set up in connection with this correspondence problem to be solved, regarding which pair of image points (image pixels) from the image at moment i and from the image at moment j correspond to each other. These hypotheses are then recorded in a hypothesis list for further processing, such as geometric object generation and object monitoring or tracking.

As explained in paragraphs [0007] – [0008], while the general overall methodology is known, the aspect of determining correspondence has involved algorithms such as differential techniques, matching techniques, energy based techniques, and phase based techniques. These known methods are based on generally computationally intensive correlation extensions, and are only capable of measuring small displacements of objects from one recorded image to the next. In particular, when using this type of algorithm in image recognition in motor vehicles, there occurs the problem, that the available data processing devices only have limited computational resources. Particularly in the case of an aggressive steering movement or a high vehicle speed, large optical flows occur in the image data.

Thus, there is a need for a process for analysis of correspondences in image data sets, and a device suitable for carrying out this process, which efficiently uses computational resources and is capable of processing large optical flows.

This more efficient method of correspondence analysis is accomplished in accordance with the present invention by the process as defined, e.g., in claim 1 – using a signature operator to generate a signature string for pixels at time i, using the same signature operator to generate a signature string for pixels at time j, storing the signature strings on tables, comparing the signature strings, and generating hypothesis on the basis of identified correlated signature strings, and recording the hypothesis for further processing.

Thus, the claims clearly and eloquently specify the useful, novel and inventive feature of the invention – the use of signature strings as basis for the correspondence analysis.

The subsequent steps of testing the hypothesis for validation, such as geometric object generation and object monitoring or tracking, are known and not the essence of the present invention.

Accordingly, the present invention having great utility, it is respectfully requested that the rejection be withdrawn.

Claim Rejections - 35 USC § 112

Claims 1 and 15 is rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

According to the Examiner, in claim 1, line 7 the phrase "the other image", as recited vague and unclear, what is being implied by phrase "the other image".

Applicants respectfully traverse, in view of the amendment of the claims.

Claim 1 as amended refers to a process for recognition and tracking of objects in image data relating to moving scenes, wherein a correspondence analysis is carried out in separate chronologically sequential image data sets in order to identify within two image data sets *i*(20) and *j*(21) image points (pixels) $u_i v_i$ $u_j v_j$ corresponding with each other, said correspondence analysis comprising:

in a first step, transforming the *image data set i* with a signature operator whereby for each pixel $u_i v_i$ a signature string (27) is computed and recorded in a signature table (22) together with the pixel coordinates; and in a subsequent step, transforming each pixel $u_j v_j$ of *the other image data set j*

Thus, claim 1 clearly refers to chronologically sequential image data sets i and j, wherein in a first step image data set i is transformed, and wherein "the other" image data set is the chronologically sequential data set j.

In claim 1, line 11 the phrase "these cases" what all these cases referring to.

In response, claim 1 has been amended for clarity.

Similarly claim 15 has been corrected.

Withdrawal of the rejection is respectfully requested.

Claim Rejections - 35 USC § 112

Claim 13 is rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In response, Claim 13 has been amended to claim a preferred embodiment of the process of claim 1. Withdrawal of the rejection is respectfully requested.

Claim Rejections - 35 USC § 101

Claims 1- 10, 14 and 15 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. According to the Examiner, the Supreme Court precedent¹ and recent Federal Circuit decisions indicate that **a statutory "process" under 35 U.S.C. 101** must **(1)** be tied to a machine or **(2)** transform underlying subject matter (such as an article or material) to a different state or thing. The instant claims recite a series of steps or acts to be performed, but neither transform underlying subject matter nor are positively tied to another statutory category that accomplishes the claimed method steps, and therefore does not qualify as a statutory process.

Applicants respectfully traverse.

MPEP section 2106 "Patent Subject Matter Eligibility" provides that, for purposes of an eligibility analysis, a physical transformation "is not an invariable requirement, but merely one example of how a mathematical algorithm [or law of nature] may bring about a useful application." AT&T, 172 F.3d at 1358-59, 50 USPQ2d at 1452. If USPTO personnel determine

that the claim does not entail the transformation of an article, then USPTO personnel shall review the claim to determine if it produces a useful, tangible, and concrete result. In making this determination, the focus is not on whether the steps taken to achieve a particular result are useful, tangible, and concrete, but rather on whether the final result achieved by the claimed invention is "useful, tangible, and concrete."

For an invention to be "useful" it must be (i) specific, (ii) substantial and (iii) credible. MPEP § 2107 and Fisher, 421 F.3d at 1372, 76 USPQ2d at 1230 (citing the Utility Guidelines with approval for interpretation of "specific" and "substantial").

The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a 35 U.S.C. 101 judicial exception, in that the process claim must set forth a practical application of that judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77 In other words, the opposite meaning of "tangible" is "abstract."

The question as to whether the invention produces a "concrete" result usually arises when a result cannot be assured. In other words, the process must have a result that can be substantially repeatable or the process must substantially produce the same result again. In re Swartz, 232 F.3d 862, 864, 56 USPQ2d 1703, 1704 (Fed. Cir. 2000). The opposite of "concrete" is unrepeatable or unpredictable.

The present claims meet all three tests – the process is useful, it produces a tangible result (object tracking based on correlation of pixels), and it is concrete, i.e., reproducible.

Thus, the claims satisfy 35 U.S.C. 101, which defines four categories of inventions that Congress deemed to be the appropriate subject matter of a patent: processes, machines, manufactures and compositions of matter. The latter three categories define "things" or "products" while the first category defines "actions" (i.e., inventions that consist of a series of steps or acts to be performed). See 35 U.S.C. 100(b) ("The term 'process' means process, art, or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.").

Applicants refer the Examiner to the following examples of patents from among the many hundreds of patents which have issued with claims similar to the present claims under examination:

6445409

5608458

6442476

6499025

6636635

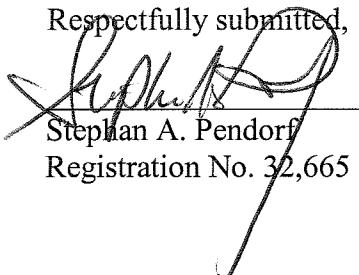
Accordingly, withdrawal of the rejection is respectfully requested.

The Commissioner is hereby authorized to charge any fees which may be required at any time during the prosecution of this application without specific authorization, or credit any overpayment, to Deposit Account Number 16-0877.

Should further issues remain prior to allowance, the Examiner is respectfully requested to contact the undersigned at the indicated telephone number.

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Respectfully submitted,


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